REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 1, 6, 11 and 16 are amended. Claims 21-32 were previously withdrawn. Claims 1-32 are pending.

Entry of Amendment under 37 C.F.R. § 1.116

The Applicant requests entry of this Rule 116 Response because: the amendments were not earlier presented because the Applicant believed in good faith that the cited references did not disclose the present invention as previously claimed; and the amendment does not significantly alter the scope of the claim and places the application at least into a better form for purposes of appeal.

The Manual of Patent Examining Procedures (M.P.E.P.) sets forth in Section 714.12 that "any amendment that would place the case either in condition for allowance or in better form for appeal may be entered." Moreover, Section 714.13 sets forth that "the Proposed Amendment should be given sufficient consideration to determine whether the claims are in condition for allowance and/or whether the issues on appeal are simplified." The M.P.E.P. further articulates that the reason for any non-entry should be explained expressly in the Advisory Action.

I. Rejection under 35 U.S.C. § 102

In the Office Action, at page 8, numbered paragraph 13, claims 1-20 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,879,664 to Suyama et al. This rejection is respectfully traversed because Suyama does not discuss or suggest:

> means for detecting a two-dimensional image of a reference workpiece of a same type as the objective workpiece;
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> means for storing, as reference information, information on a surface of a first region including a characteristic part of the objective workpiece and a surface of a second region as a target region of three-dimensional measurement of the objective workpiece, said information on the first and second regions being obtained from the detected two-dimensional image of the reference workpiece of the same type as the objective workpiece, which is captured from a predetermined position;
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> means for capturing an image of the objective workpiece and determining a region corresponding to said first region in the image of the objective workpiece;

> means for determining a region corresponding to said second region based on information on a position of the region determined as corresponding to said first region and said reference information stored in said storage means; and
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> means for obtaining three-dimensional information on the objective workpiece in the region determined as corresponding to said second region of an image of the objective workpiece captured by projecting said reference beam onto the objective workpiece,

as recited in amended independent claim 1.

Suyama discusses a 3-D position sensor and 3-D position setting system including a 3-D position sensor which has projectors 31-34 arranged on a teaching head 3 for projecting beams onto an object 9 and forming on the object 9 bright spots S1-S4. Reference position marks M1-M4 are generated to set a distance between workpiece 9 and the head and a posture of the head. Suyama discusses that if the distance between workpiece 9 and the head 3 is a predetermined value and the posture of the head 3 is proper, the workpiece is represented as workpiece 9'. Bright spots S1-S4 are formed at intersection points between the beams and workpiece 9. Changes in distance and posture with respect to workpiece 9 appear as deviations in bright spots S1-S4 on display unit 7. If the distance between the head 3 and the workpiece 9 is larger than that between head 3 and workpiece 9' located at the reference position, the respective bright spots are located outside reference marks M1-M4. If workpiece 9 is inclined vertically or in a right-to-left direction with respect to workpiece 9', spot S2 is located inside mark M2 and spots S3, S4 are deviated in one direction with respect to marks M3, M4.

First, Suyama does not discuss or suggest detecting a two-dimensional image of a reference workpiece of a same type as an objective workpiece. Suyama discusses that workpiece 9' is located at a reference position, but not that workpiece 9' is a reference workpiece and that workpiece 9 is an objective workpiece. Suyama specifically discusses that "[i]f the distance between workpiece 9 and head 3 is a predetermined value and the posture of head 3 is proper, the workpiece is represented as workpiece 9'." Thus, Suyama does not distinguish between a reference workpiece and an objective workpiece of a same type as the reference workpiece.

Further, Suyama does not discuss or suggest that a 2-D image of a reference workpiece of the same type as an objective workpiece is detected. Suyama discusses only that reference marks M1-M4 are superposed on an image signal at predetermined positions on a screen of display unit 7. Suyama does not suggest that a 2-D image of a reference workpiece is detected.

Second, Suyama does not discuss or suggest storing information on a surface of a first region including a characteristic part of the objective workpiece and a surface of a second region as a target region of 3-D measurement of the objective workpiece, where the information on the first and second regions is obtained from the detected 2-D image of the reference workpiece of the same type as the objective workpiece. The Examiner alleges that the first region corresponds with mark M1 of Fig. 6B and the second region corresponds with mark S1 of Fig. 6B of Suyama. The Applicants respectfully disagree.

Specifically, the Examiner alleges that the detected 2-D image is of a reference workpiece, which the Examiner has alleged corresponds with workpiece 9'. However, Suyama particularly recites that marks M1-M4 are reference marks of the workpiece 9' located at the reference position, and that spots S1-S4 are formed at intersection points between the beams and workpiece 9 (comparative to reference workpiece 9'). Therefore, mark M1 cannot correspond with a first region and spot S1 cannot correspond with a second region, which are obtained from the same detected 2-D image of the reference workpiece. Thus, both the alleged first and second regions in Suyama cannot be obtained from the detected 2-D image of a reference workpiece, if the reference workpiece, as alleged, corresponds with only workpiece 9'.

Additionally, Suyama does not discuss or suggest storing information on a surface of a first region including a characteristic part of an objective workpiece and a surface of a second region as a target region of 3-D measurement of the objective workpiece. In contrast, as shown in Fig. 1 of the present invention, for example, information on a surface of region A and a surface of target region B is obtained from the same image of a reference workpiece which is detected by a camera.

Third, Suyama does not discuss or suggest capturing an image of the objective workpiece and determining a region corresponding to the first region in the image of the objective workpiece, and determining a region corresponding to the second region based on information on a position of the region determined as corresponding to the first region and the stored reference information. As shown in Fig. 2, an image of the objective workpiece is captured and region A', corresponding to the first region (region A), is determined. Further, region B', corresponding to the second region (region B), is determined based on information on a position of the region (region A') determined as corresponding to the first region (region A) and the stored reference information (for example, information on region B). Suyama discusses that spots S1-S4 are compared with reference marks M1-M4. However, Suyama does not suggest that an image of an objective workpiece, which is separate from the detected image of a reference workpiece, is captured, that a region corresponding to the obtained first region is determined, and that a region corresponding to the obtained second region is determined based on information on a position of the region determined as corresponding to the first region and stored reference information, which is obtained from the 2-D image of the reference workpiece.

The Examiner alleges that the first region obtained from the 2-D image of the reference workpiece corresponds with mark M1, and then alleges that the region corresponding to the first region is also mark M1 (see pages 3 and 5, for example, of the Final Office Action). The Applicants respectfully disagree, as mark M1 cannot be both a first region and a region corresponding to the first region in the image of the objective workpiece. Further, the Examiner alleges that the second region which is the target region of 3-D measurement of the objective workpiece corresponds with mark S1, and then alleges that the region corresponding to the second region corresponds with mark M1. The Applicants respectfully disagree, as mark M1 cannot be both the first region, a region corresponding to the first region, and a region corresponding to the second region.

As shown in Figs. 1 and 2, the present invention of claim 1, for example, includes a first region A including a characteristic part of an objective workpiece, a second region B set as a target region of 3-D measurement of the objective workpiece, where reference information on the first A and second B regions is obtained from a 2-D image of a reference workpiece, a region A' corresponding to the first region A in the 2-D image of the objective workpiece, and a region B' corresponding to the second region B based on information on a position of the region B' determined as corresponding to the first region A and the reference information. In Suyama, the mark M1 is not a first region, a region corresponding to a first region (mark M1) and also a region corresponding to a second region.

Further, Suyama does not discuss or suggest obtaining 3-D information on the objective workpiece in the region determined as corresponding to the second region of an image of the objective workpiece captured by projecting a reference beam onto the objective workpiece. Specifically, Suyama does not suggest obtaining 3-D information on an objective workpiece in the mark M1, which the Examiner alleges corresponds to the region determined as corresponding to the second region of an image of the objective workpiece.

Therefore, as Suyama does not discuss or suggest "means for detecting a two-dimensional image of a reference workpiece of a same type as the objective workpiece; means for storing, as reference information, information on a surface of a first region including a characteristic part of the objective workpiece and a surface of a second region as a target region of three-dimensional measurement of the objective workpiece, said information on the first and second regions being obtained from the detected two-dimensional image of the reference workpiece of the same type as the objective workpiece, which is captured from a predetermined position; means for capturing an image of the objective workpiece and determining a region corresponding to said first region in the image of the objective workpiece; means for determining a region corresponding to said second region based on information on a position of the region determined as corresponding to said first region and said reference information stored in said storage means; and means for obtaining three-dimensional information on the objective workpiece in the region determined as corresponding to said second region of an image of the objective workpiece captured by projecting said reference beam onto the objective workpiece," as recited in amended independent claim 1, claim 1 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Further, Suyama does not discuss or suggest "means for detecting a two-dimensional image of a reference workpiece of a same type as the objective workpiece; means for storing, as reference information, information on a surface of a first region including a characteristic part of the objective workpiece and a surface of a second region as a target region of three-dimensional measurement of the objective workpiece, said information on the first and second regions being obtained from the detected two-dimensional image of the reference workpiece of the same type as the objective workpiece, which is captured from a predetermined position; means for capturing an image of the objective workpiece and determining a region corresponding to said first region in the image of the objective workpiece; means for determining a region corresponding to said second region based on information on a position and an orientation of the region determined as corresponding to said first region and said reference information stored in said storage means; and means for obtaining three-dimensional information on the objective workpiece in the region determined as corresponding to said second region of an image of the objective workpiece captured by projecting said reference beam onto the objective workpiece," as recited in amended independent claim 6, claim 6 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Also, Suyama does not discuss or suggest "means for detecting a two-dimensional image of a reference workpiece of a same type as the objective workpiece; means for storing, as reference information, information on a surface of a first region including a characteristic part of the objective workpiece and a surface of a second region as a target region of three-dimensional measurement of the objective workpiece, said information on the first and second regions being obtained from the detected two-dimensional image of the reference workpiece of the same type as the objective workpiece, which is captured from a predetermined position; means for capturing an image of the objective workpiece and determining a region corresponding to said first region in the image of the objective workpiece; means for determining a region corresponding to said second region based on information on a position and a size of the region determined as corresponding to said first region and said reference information stored in said storage means; and means for obtaining three-dimensional information on the objective workpiece in the region determined as corresponding to said second region of an image of the objective workpiece captured by projecting said reference beam onto the objective workpiece," as recited in amended independent claim 11, claim 11 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Additionally, Suyama does not discuss or suggest "means for detecting a two-dimensional image of a reference workpiece of a same type as the objective workpiece; means for storing, as reference information, information on a surface of a first region including a characteristic part of the objective workpiece and a surface of a second region as a target region of three-dimensional measurement of the objective workpiece, said information on the first and second regions being obtained from the detected two-dimensional image of the reference workpiece of the same type as the objective workpiece, which is captured from a predetermined position; means for capturing an image of the objective workpiece and determining a region corresponding to said first region in the image of the objective workpiece; means for determining a region corresponding to said second region based on information on a position, an orientation and a size of the region determined as corresponding to said first region and said reference information stored in said storage means; and means for obtaining three-dimensional information on the objective workpiece in the region determined as corresponding to said second region of an image of the objective workpiece captured by projecting said reference beam onto the objective workpiece," as recited in amended independent claim 16, claim 16 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Claims 2-5, 7-10, 12-15 and 17-20 depend either directly or indirectly from independent claims 1, 6, 11 and 16 and include all the features of their respective independent claims, plus additional features that are not discussed or suggested by the reference relied upon. For example, claim 2 recites that, "said reference information includes information on a position of said first region and a position and a range of said second region." Specifically, the Examiner indicates that K represents a range of a second region. It is unclear how scribed line K corresponds with a range of bright spot S1. Therefore, claims 2-5, 7-10, 12-15 and 17-20 patentable distinguish over the reference relied upon for at least the reasons noted above. Accordingly, withdrawal of the §102(b) rejection is respectfully requested.

Conclusion

In accordance with the foregoing, claims 1, 6, 11 and 16 have been amended. Claims 1-20 are pending and under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: December 28, 2007

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